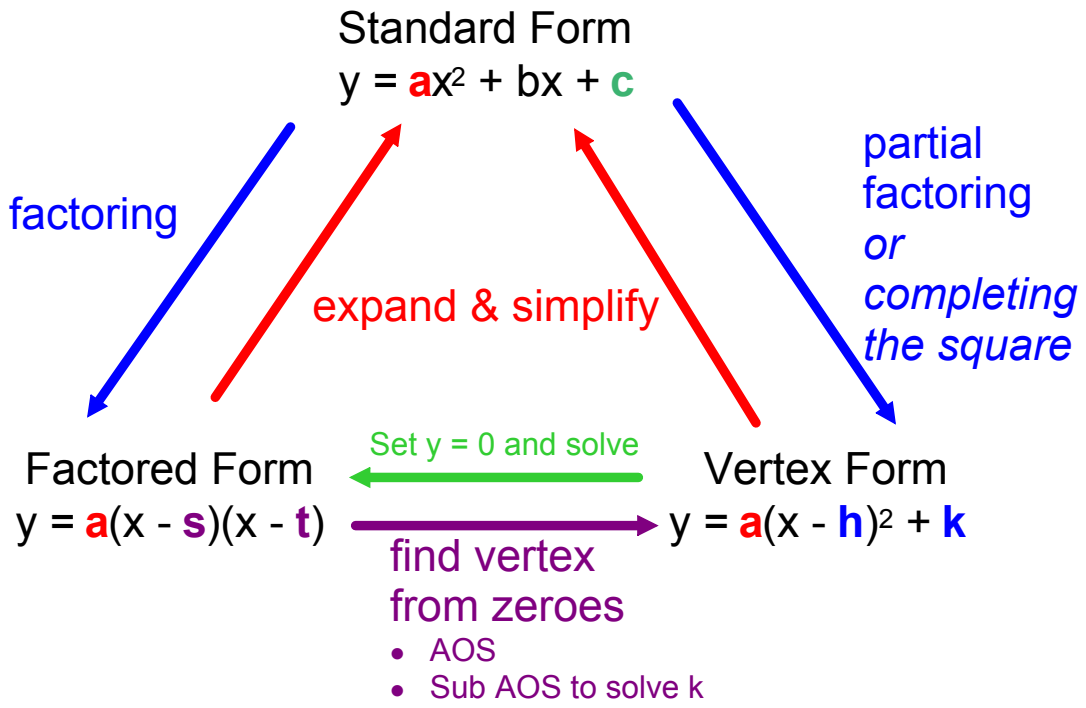
4.5 - Relating Three Forms of a Quadratic Equation



Ex.1 Expand & simplify each equation to obtain the standard form equation.

(a) $y = 2(x + 5)(x - 1)$

$y = 2(x^2 - x + 5x - 5)$

$= 2(x^2 + 4x - 5)$

$y = 2x^2 + 8x - 10$

$-0.5(x-4)(x-4)+3$

(b) $y = -0.5(x - 4)^2 + 3$

$= -0.5(x^2 - 4x - 4x + 16) + 3$

$= -0.5(x^2 - 8x + 16) + 3$

$= -0.5x^2 + 4x - 8 + 3$

$= -0.5x^2 + 4x - 5$

Ex.2 Write $y = x^2 - 4x + 3$ in factored form and vertex form.

$0 = (x-1)(x-3)$

State 1 and 3

$AOS = \frac{1+3}{2}$

$x = 2$

Sub $x=2$ into equation to solve

$= (2)^2 - 4(2) + 3$

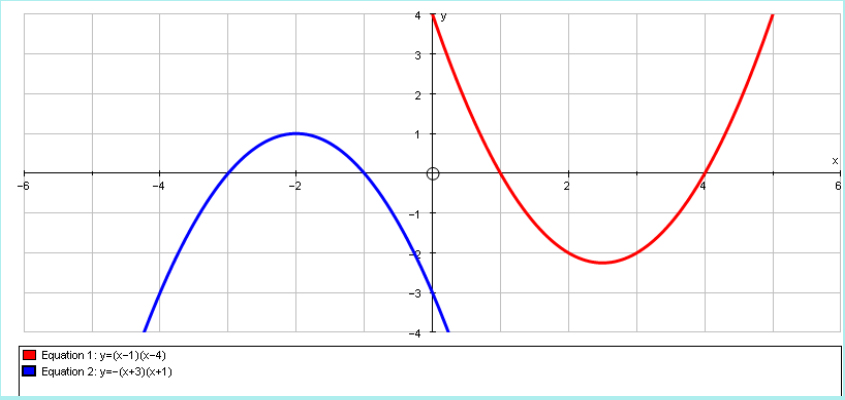
$= 4 - 8 + 3$

$= -1$

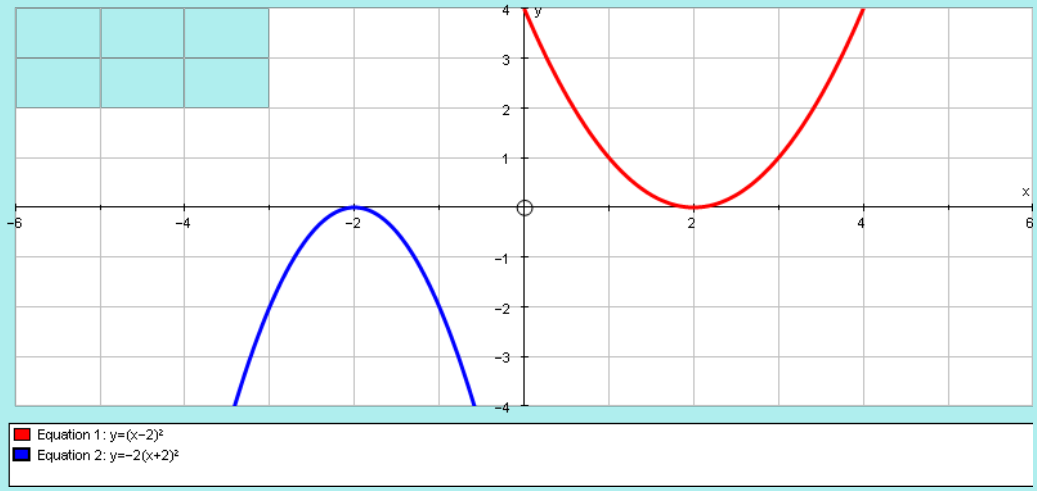
$y = (x-2)^2 - 1$

If the parabola crosses the x-axis, the x-coordinates of the crossing points are called the zeroes, or roots, or x-intercepts.

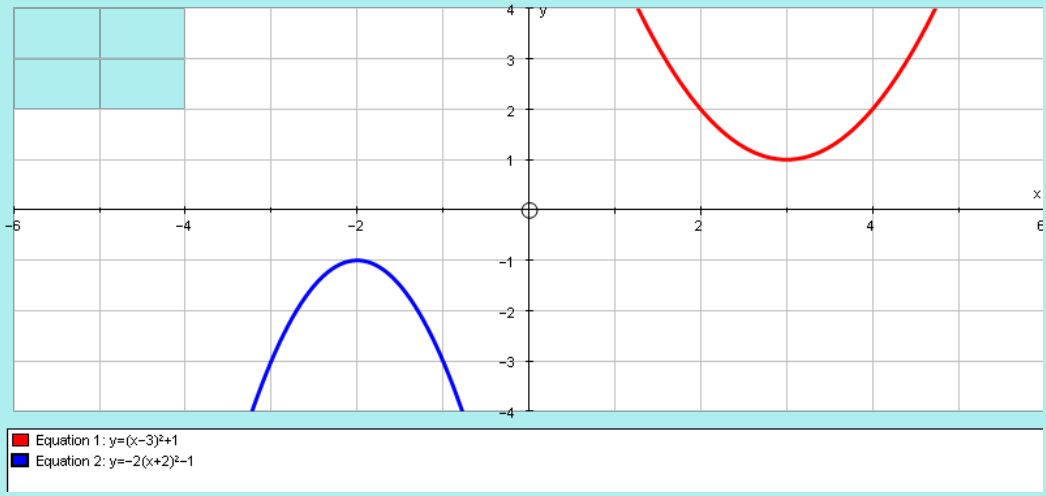
A parabola may have two zeros:



Or one zero:



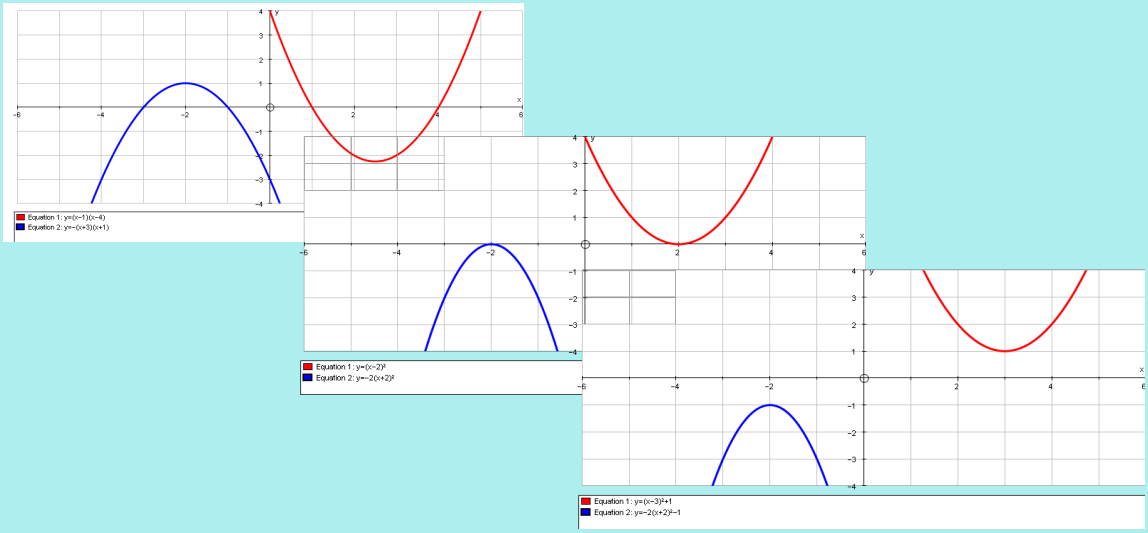
Or no zeroes:



Recall:

(1) Factored form indicates the zeroes of the quadratic relation.

(2) A quadratic relation can have 2, 1, or no zeroes.



Not all quadratics have zeroes, which means they cannot be factored.

Instead, use symmetry to perform a **partial factoring**.

1) Determine two points that have the **same y-value**.
   - start with a point that is given and then find the matching point with the same y-value
   - the y-intercept is usually a good choice

2) Find the x-value of the vertex (h) using symmetry

3) Find the y-value of the vertex (k) by subbing h into the original equation.

Partial Factoring Ex.3

Determine the vertex, and the vertex form, of
$y = x^2 - 12x + 5$

$5 = x^2 - 12x + 5$

$0 = x^2 - 12x$

$0 = x(x-12)$

$x = 0$ or $x - 12 = 0$, $x = 12$

$AOS = \frac{0+12}{2}$

$x = 6$

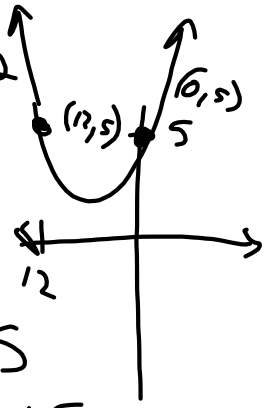
Sub $x = 6$

$y = x^2 - 12x + 5$

$= (6)^2 - 12(6) + 5$

$= -31$

$y = (x-6)^2 - 31$



Partial Factoring Ex. 4

Determine the vertex, and the vertex form, of
$y = -3x^2 + 15x + 2$

$(0,2)$ $(\_,2)$

$2 = -3x^2 + 15x + 2$

$0 = -3x^2 + 15x$

$0 = -3x(x-5)$

$-3x = 0$ or $x - 5 = 0$

$x = 0$ $x = 5$

$AOS = \frac{0+5}{2}$

$x = 2.5$

Sub $x = 2.5$

$= -3(2.5)^2 + 15(2.5) + 2$

$= 20.75$

$y = -3(x-2.5)^2 + 20.75$

Assigned Work:

p.293 # 4c, 5a, 6a, 9ac, 10c
p.301 # 4c, 5ae, 7c